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IN THE SPECIFICATION

[0011] The liquid storage reservoir 22 of the type shown would typically be installed indoors, while a heat pump 30 is installed outdoors. The heat pump 30 includes a heat rejecting heat exchanger 32, expansion valve 34, heat absorbing heat exchanger 36 and compressor 38. The heat pump can operate in an on mode or be shut down in an off mode.

[0014] To prevent freezing while the heat pump 30 is off, the pump 40 is switched to pump in the reverse direction at a low flow rate, as shown in Figure 2. That is, the pump 40 is reversible. While the heat pump 30 is off, the pump 40 pumps water from the hot section 24 of the liquid storage reservoir 22 to the heat rejecting heat exchanger 32 of the heat pump 30, and from the heat exchanger 32 to the cold section 26 of the liquid storage reservoir 22. If the ambient outdoor temperature is below freezing, the hot liquid leaving the hot section 24 will more easily prevent freezing of the lines 46, pump and heat pump 30, thus permitting a lower flow rate than in prior art systems. The cold water returning from outdoors will be returned to the cold section 26 of the liquid storage reservoir 22, thus preventing mixing of the hot and cold sections 24, 26 in the liquid storage reservoir 22.

[0015] The pump 40 may switch to the freeze-prevention reverse direction mode whenever the heat pump 30 is off. A control 192 for the pump 40 may be included. Alternatively, the pump 40 may switch to the freeze-prevention mode only when the temperature sensor 44 measures liquid temperature below a third set point (e.g. slightly above freezing). As another alternative, a third temperature sensor 190 (not shown) could be provided to measure only the outdoor temperature, so that the pump 40 switches to the freeze-prevention mode based upon the outdoor

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temperature, or some combination of the outdoor temperature and temperature measured by sensor 44.